## REMARKS

*Summary of Rejections*

Claims 1-12 and 14-17 were pending in this application, prior to the current amendment. No claims have been allowed.

Claim 1 is rejected under 35 USC 102(b) as being anticipated by Huang (U.S. patent no. 6,004,489), which discloses a method for designing an extrusion process and die.

Claims 2-11 and claim 17 are rejected under 35 USC 103(a) as being unpatentable over Huang. The examiner contends that it would have been an obvious matter of design choice to a person of ordinary skill in the art to use a plate model with a thickness of 10% of its cross-sectional area. Claims 2 and 17 of the present application recite the 10% thickness limitation, and claims 3-11 depend from claim 2.

Claims 12 and 13 are assessed by the examiner to be incomplete, and have not yet been examined. Dependent claims 14-16 have therefore also not yet been examined. The examiner does, however, comment on the use of the term "electron discharge machine," which appears in claims 15-16, and which the examiner contends is insufficiently defined in the specification, making its meaning indefinite in the claims.

*Applicant Amends Claim 2 and Claims 14-15 to Correct Typographical Errors*

The examiner has noted that claims 12 and 13 appear incomplete. The applicant recognizes that a typographical error was made in numbering the claims. In fact, claim 12 is complete, but one claim number (13) has been inadvertently skipped. Claim 13 therefore does not exist in the present application. To correct subsequent dependency errors resulting from the omission of claim 13, dependent claims 14-15 have been amended to correct the references to the claims from which they depend. Claim 14 now depends from claim 12, not claim 13. Claim 15 also now depends from claim 12, not claim 13.

In addition, claim 2 has been amended to correct a punctuation error. A period has been added to claim 2. In making these corrective non-substantive amendments, the applicant respectfully asserts that no new matter has been presented, and requests examination and/or re-consideration, and timely allowance, of the amended claims.

*Applicant Amends Claims 1, 12, and 17 to Distinguish the Present Invention's Focus on Extrudate Die Swell from Huang's Reliance on Die Deflection*

The applicant respectfully asserts that the present invention is distinguished from Huang's patented invention, because the present invention focuses on die swell characteristics of an extrudate, whereas Huang's design is dependent upon die deflection, i.e. mechanical bending of the die hardware resulting from pressure on the die walls. The applicant wishes to distinguish between the two inventions, based on the existing text of the Huang patent and the claims of the applicant's disclosure, but additionally chooses to amend the present claims to further distinguish the present invention.

In the present application, page 1, lines 19 through 26, the applicant states that "extrudate can swell or shrink anywhere from 10% to 300%," establishing the difficulty in determining the "proper flow channel geometry to minimize uneven swelling by engineering calculations." On page 2 of the present application, lines 14-16, the applicant notes that "much of the problem is caused by the fact that the extruded material stores energy while under pressure, and then swells as it exits the die." Clearly, die swell, as this problem is called throughout the present application, particularly in the "*Die Swell*" section of the application, pages 13-14, refers to the expansion of the extrudate material as it exits the die.

Conversely, Huang states in column 14, lines 54-59, "when a die is subjected to the high temperatures and pressures of an extrusion process, the die walls bend . . . The method of the present invention designs a die that accommodates this bending so that it will not negatively effect (sic) the extruded product." The Huang patent, therefore deals with deflection of the die walls, which is typically negligible in comparison to extrudate die swell. In contrast, the present invention deals with extrudate die swell, not die wall deflection. The applicant respectfully submits that the present invention as claimed is therefore distinguished from and, unanticipated by, the Huang reference patent. Nevertheless, the applicant chooses to amend the present claims, to further differentiate the two inventions in this critical aspect.

In the present invention, page 7, line 25 through page 8, line 17, the applicant describes the calculation of a multiplication factor, F, which is calculated from extrudate

die swell values, and applied to adjust deflection calculations made by a finite element analysis. Nowhere in the Huang reference is such a multiplication factor calculated from extrudate die swell information, nor is such a multiplication factor applied to a measured edge deflection. Therefore, in the present application, the applicant has amended claims 1, 12, and 17 to specifically include further limitation on the calculation and application of the multiplication factor.

Independent claims 1, 12, and 17 now contain the amended language "F, based on a calculated extrudate die swell value DS, said multiplication factor, F," to more specifically describe the multiplication factor calculated and applied as claimed. The variable representing the multiplication factor , F, has also been added to the element of each of claims 1, 12, and 17 following the element, or step, in which the multiplication factor, F, is introduced, thereby more specifically limiting the multiplication factor.

The applicant respectfully asserts that the previously existing distinction between the present invention and the Huang invention, with regard to extrudate die swell versus die deflection, has been emphasized by the amended claim language. The amendment narrows an element of the claims to specifically describe the calculation of a multiplication factor not present in the Huang patent. The basis for the claim amendment is found, as stated above, on pages 7-8 of the present application, wherein calculation of a multiplication factor, F, which is calculated from extrudate die swell values, is described. The applicant respectfully asserts that no new matter has been added in this amendment. The applicant therefore asserts that independent claims 1, 12, and 17 are now in condition for allowance, and so therefore are claims 2-11 and claims 14-16, which depend from amended claims 1 and 12 respectively. The applicant respectively requests reconsideration and allowance of these claims.

*Applicant Traverses the 103(a) Rejection of Claims 2-11 and 17*

The examiner asserts that the applicant's selection of a plate model with thickness of about ten percent of its cross-sectional area would have been an obvious matter of design choice to a person of ordinary skill in the art. The applicant respectfully asserts, however, as supported on page 5, lines 20-28, that "The subject invention relies on a *novel recognition of the analogy between the bending behavior of a membrane under*

*pressure, and the fluid flow velocity of the extruded material* through a profile of the same shape. (Emphasis by applicant). The novel analogy requires that the membrane behave similarly to a soap film with insignificant bending strength, therefore the properties for a thin rubber membrane are appropriate. Typically for rubber materials, a thickness of about ten percent of the cross-sectional dimension of the plate will provide appropriate bending behavior . . ."

Because the present invention relies on the "novel recognition of the analogy" requiring that the membrane "behave similarly to a soap film with insignificant bending strength," the applicant respectfully submits that the known art teaches away from the present invention, and the present invention therefore provides an unexpected result. The applicant respectfully asserts, therefore, that the choice of a ten percent thickness would not be an obvious design matter, and therefore is not obvious under 35 USC 103(a).

The applicant respectfully asserts that claim 2, 12, and 17, which all recite the ten percent limitation are in condition for allowance, not only because they are unanticipated from Huang under 102(b) as discussed above, but also because the use of a ten percent thickness as claimed would not have been obvious to a person of ordinary skill in the art. The applicant therefore respectfully requests examination and/or re-consideration, and allowance, of these claims.

*Applicant Traverses Examiner's Assertion That the Phrase "Electron Discharge Machine" is Indefinite*

The examiner asserts that the term "electron discharge machine" as used in claims 15-16 is used to mean "electro-discharge machine," which the examiner contends has an accepted meaning related to high voltage corona generators. The examiner asserts that the specification of the present application does not clearly re-define the term, leaving its meaning indefinite in the claims.

The applicant respectfully disagrees, and asserts that electron discharge machining is well known by persons of ordinary skill in the arts of engineering, machining, tool and die manufacture, and other technical fields associated with the subject matter of the present invention. Although "electro-discharge machine" may have an accepted meaning in another context, "electron discharge machining" is well known in

the engineering and machining arts, and a person of ordinary skill in those arts, reading the present application and understanding it in the context of die design, would typically comprehend the intended meaning of the term.

The term "electron discharge machining" is commonly used in industry, and is synonymous with "electrical discharge machining," which Huang mentions in the referenced patent in column 15, lines 20-21 ("Electrical Discharge Machine (EDM)"). The applicant respectfully notes that the specification of the present application likewise uses the established acronym "EDM" on page 9, line 22, of the present invention.

It is generally understood in industry that electron discharge machining is often "numerically controlled," hence the additional reference to a "Computer Numerical Control Machine (CNC)" in column 15, line 21 of the Huang patent. The present application similarly refers to "utilization of a numerically controlled milling machine," utilization of "an electron discharge machine (EDM)," and the more specific "wire EDM machine" for removing material from a production blank in order to manufacture die hardware (see page 9, lines 20-24).

To support the applicant's assertion that electron discharge machining is known in the art, the applicant respectfully draws attention to a number of informative websites on the subject, to supplement the reference within the Huang patent. The first such website is located at http://www.ormondllc.com/waterjet.html . Ormond LLC is a company that advertises its machining services, including electron discharge machining. The Ormond website states that "The technologies available at Ormond make it possible to reduce manufacturing costs in applications employing conventional machining methods such as CNC milling, *electron discharge machining (EDM)*, and chem-milling." (Applicant's emphasis). A hard copy of the Ormond website is hereto appended as "Attachment A."

Another such website, http://www.anaori.co.jp/CHTML/Mitsumori/e_Product_2-1.html, provides similar information, advertising products and services from a Japanese company named Anaori Carbon. The Anaori website lists products and services including, but not limited to, semiconductors, *electron discharge machining*, graphite powder, continuous casting, electrical machines, and carbon fiber reinforced plastics. A paper copy of the Anaori website is hereto appended as "Attachment B."

Additionally, information on the acronym "EDM" is provided at http://acronyms.thefreedictionary.com/EDM . Many accepted meanings for the acronym are listed on the website, including "electron discharge machining" and "electric(al) discharge machining." A copy of the "Free Dictionary" website has been appended to this document as "Attachment C." Clearly, electron discharge machining, known synonymously as electrical discharge machining, is a well-established practice, and would be known by a person of ordinary skill in the art of die design and manufacture. For this reason, the applicant respectfully asserts that the term "electron discharge machine" is not indefinite, nor is it necessary that the specification re-define the term.

*Conclusion*

For all of the above reasons, the applicant respectfully submits that the claims as amended are in proper form, and define patentably over the prior art. Therefore, the applicant submits that the present application is in condition for allowance, which he now respectfully solicits. Early action to this end is gratefully requested.

Respectfully submitted,

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757-988-1916

ORMOND

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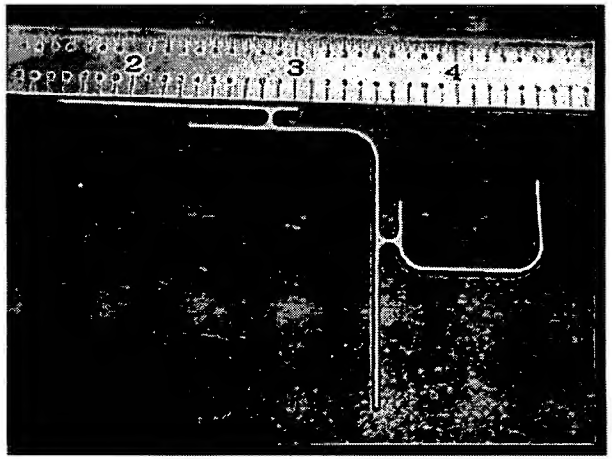
About Waterjets

## Waterjet Machining Services

Many unique waterjet-machining technologies that can not be performed with commercially available tooling are made available at Ormond through in-house contract machining services.

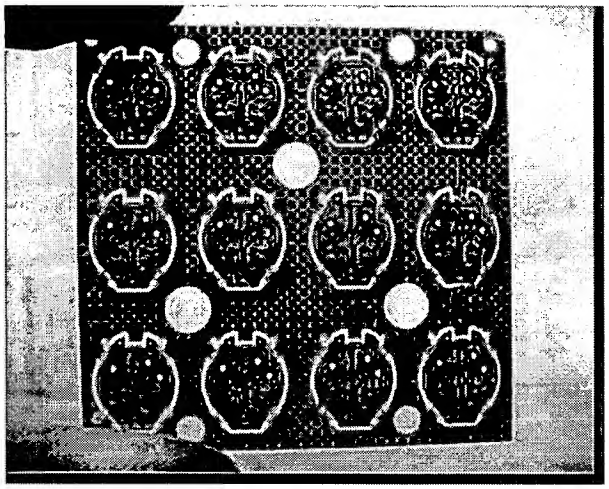
Through its engineering staff, Ormond has an intimate knowledge of all aspects of advanced waterjet machining techniques. The technologies available at Ormond make it possible to reduce manufacturing costs in applications employing conventional machining methods such as CNC milling, electron discharge machining (EDM), and chem-milling.



Processes such as precision waterjet cutting, small hole drilling, thin kerf cutting, grooving, controlled depth milling and others are offered to cover a wide range of exotic or conventional materials.



"Attachment A"



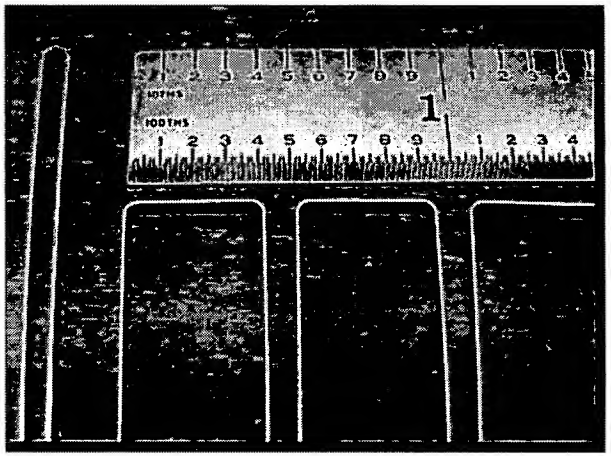
There are currently more than 400 abrasive waterjet machine shops performing basic loose tolerance 2-D machining in the US. The average shop size is $1M and this small size precludes an experienced engineering staff. Ormond has the ability to engineer advanced waterjet manufacturing solutions that are tailored to the customers' specific applications, giving them a substantial advantage over their competitors. It has been Ormond's experience that this advanced capability provides gains over not only other waterjet shops, but other machining techniques as well. For example, waterjets are 10 times faster than EDM machines but conventional waterjets are not as precise. Ormond's technologies, however, allow us to approach the precision of the EDM and provide customers with significant cost savings in many applications.

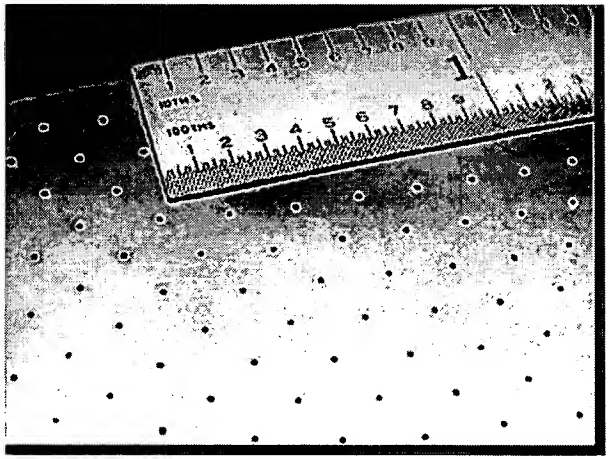
### *Precision Waterjet Machining*

Although some waterjet systems available elsewhere are capable of machining to close tolerances, it is very difficult to do so in the production atmosphere with acceptable scrap levels.

Special tooling designed at Ormond reliably and economically enables

production quantities numbering in the thousands to be machined with 2-axis to 5-axis tolerances of as tight as +/-0.001 inches (+/-0.025 mm). This is a significant advancement over the capabilities at other waterjet machine shops.





***Hole Drilling***

Precision holes are machined in a wide range of difficult to machine materialsincluding glass, ceramics, and hard and brittle metals. Small diameters, very tight tolerances and long aspect ratios are possible in many applications to produce holes much more economically than is possible with the EDM. Heat affected zones and subsurface flaws are not an issue with the abrasive-waterjet.



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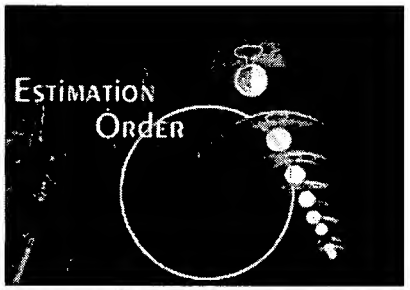


ANAORI CARBON

www.anaori.co.jp

P Product Information

** Electron Discharge Machining **

**Graphite Electrode Materials**

Anaori Carbon, a domestic Japanese maker, has had various carbon and graphite materials in stock in cooperation with major overseas makers from the outset of its business. Materials for electrode use are available through our company.

- Semiconductors
- Electron Discharge Machining
- Graphite Powder
- Continuous Casting
- Optical Fiber
- Machines
- Heat-resistant (heat generating) Machines
- Electrical Machines
- Electrolysis
- CFRP (Carbon fiber reinforced plastic) Products
- Other

To ask questions about our company's products, please click here

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"Attachment B"

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# EDM

Also found in: Dictionary/thesaurus, Computing, Wikipedia

0.03 sec.



| Acronym | Definition |
|---|---|
| EDM | Early Day Motion (UK parliament) |
| EDM | EDM Drilling Machines |
| EDM | Edmonton, Alberta (Canada) |
| EDM | Ego Defense Mechanism (psychology) |
| EDM | Electric Dipole Moment |
| EDM | Electric(al) Discharge Machining |
| EDM | Electro Discharge Machining |
| EDM | Electro-magnetic Distance Measurement |
| EDM | Electro-optical Distance Measurement |
| EDM | Electron Devices Meeting |
| EDM | Electron Discharge Machining |
| EDM | Electronic Dance Music |
| EDM | Electronic Data Management |
| EDM | Electronic Direct Mail |
| EDM | Electronic Discharge Machining |
| EDM | Electronic Distance Measurement |
| EDM | Electronic Distance Meter |

"Attachment C"

| | |
|---|---|
| EDM | Electronic Document Management |
| EDM | Emergency Destruction of Munitions |
| EDM | Emergency Disaster Management |
| EDM | Employee Development Manager |
| EDM | Engineering Data Management |
| EDM | Engineering Demonstration Model |
| EDM | Engineering Development Model |
| EDM | Enhanced Data Mode |
| EDM | Enterprise Data Management |
| EDM | Enterprise Data Model |
| EDM | Enterprise Desktop Manager |
| EDM | Equipment Deadlined for Maintenance |
| EDM | Essential Drugs and Medicines Policy (WHO) |
| EDM | Express Development Methodology |
| EDM | Extended Data Message |
| EDM | Extensor Digiti Minimi |
| EDM | External Device Monitoring |
| EDM | External Digital Modulation (Agilent) |
| EDM | Master of Education |

submit new definition



## Acronyms browser

- EDLIS
- EDLM
- EDLO
- EDLP
- eDLPI
- EDLS
- EDLW
- **EDM**
- EDM/CA
- EDMA
- EDMC
- EDMCC
- EDMD
- EDME
- EDMED

## Full browser

- EDL
- EDL
- EDL
- EDL Boards
- EDLC
- EDLCC
- Edle
- Edlén, Bengt
- Edler
- Edler von Daniels
- Edlesborough
- Edlesborough School
- Edlin
- Edlin
- Edlin
- Edlingham Castle
- EDLIS
- EDLM
- EDLO
- EDLP
- eDLPI
- EDLS
- EDLW
- **EDM**
- EDM Drilling Machines
- EDM/CA
- EDMA
- Edman degradation
- Edman, Irwin
- EDMC
- EDMCC
- EDMD
- EDME
- Edme Bouchardon
- Edmé Bouchardon
- Edme Boursault
- Edmé Boursault
- Edme Mariotte
- Edme Patrice, Count of MacMahon
- Edme-Armand-Gaston d'Audiffret-Pasquier
- Edme-Jean Leclaire
- EDMED
- Edmée Daenen
- Edmer
- Edmer
- Edmeston
- Edmeston AB
- Edmeston Centre

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